KU LEUVEN

KHLEUVEN
KATHOLIEKE HOGESCHOOL LEUVEN
Associatie Katholieke Universiteit Leuven

Country report: Belgium (Flanders)

Computing in Secondary Education

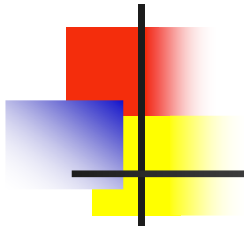
Lorentz Center, Leiden, 2014-09-17

Bern Martens

Department of Teacher Education
Leuven University College

Teacher Training
Leuven University

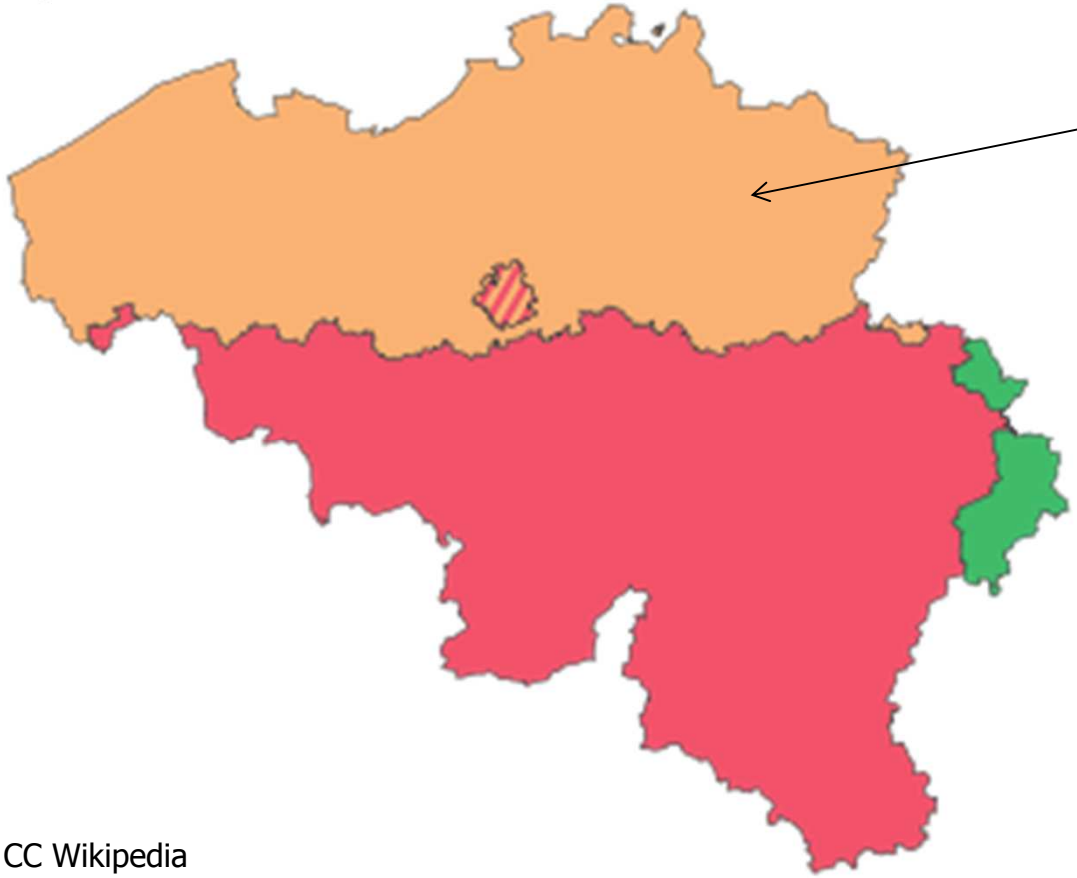
http://people.cs.kuleuven.be/~bern.martens



Introducing: myself

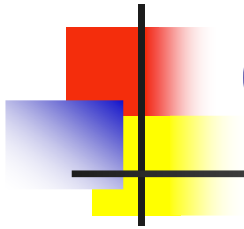
- Studies: Mathematics and Computer Science
- PhD in CS, KU Leuven
- 1998: lecturer teacher education secondary school, Leuven University College ("prof. bachelor" level)
  - CS (programming, PCK/"didactics", social & ethical issues, …)
  - Team leader Science & Technology
- 2009: lecturer teacher training (CS - Technology) Leuven University (master level)
- 2013: co-founder of i22n, Forum for Computer Science
- Also here: Annick Van Daele and Francis wyffels (Ugent)

Introducing: Belgium



Flanders
pop: +/- 6,5 M
(Denmark: +/- 5,6 M)

CC Wikipedia



Overview

- Current (+/- official) situation
  - (Primary and) secondary education
  - Teacher education
- Roads towards the future (?)
  - i22n
  - Some other initiatives: Coderdojo, Dwengo, schools
  - Educational policy improvement
  - STEM

Currently in education …

Grade	Fields	Legally binding	Level of CE "on paper"	Level of CE in most classes
5-8	all	yes	DL	DL
9-10	most	no	DL + CS	DL
11-12	option in Economy field	no	DL + CS	DL + CS
11-12	STEM field	no	none	none

DL: Digital literacy (how to use ICT)
CS: Computer Science (how to understand & make ICT)

Source: Martens & Hofkens, poster WIPSCE 2013

Currently in education: grades 5-8

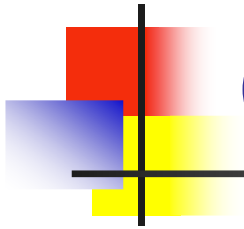
	De leerlingen
1	hebben een positieve houding tegenover ICT en zijn bereid ICT te gebruiken om hen te ondersteunen bij het leren.
2	gebruiken ICT op een veilige, verantwoorde en doelmatige manier.
3	kunnen zelfstandig oefenen in een door ICT ondersteunde leeromgeving.
4	kunnen zelfstandig leren in een door ICT ondersteunde leeromgeving.
5	kunnen ICT gebruiken om eigen ideeën creatief vorm te geven.
6	kunnen met behulp van ICT digitale informatie opzoeken, verwerken en bewaren.
7	kunnen ICT gebruiken bij het voorstellen van informatie aan anderen.
8	kunnen ICT gebruiken om op een veilige, verantwoorde en doelmatige manier te communiceren.
9	kunnen afhankelijk van het te bereiken doel adequaat kiezen uit verschillende ICT-toepassingen.
10	zijn bereid hun handelen bij te sturen na reflectie over hun eigen en elkaars ICT-gebruik.

Source: Flemish "Vakoverschrijdende ICT-eindterment 1ste graad Sec. Ond.", 2007

Currently in education: grades 9-10

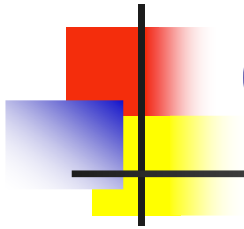
OVERZICHTSTABEL VAN DE LEERPLANONDERDELEN	Mogelijke lestijden aso/tso/kso
Computers, gegevensbeheer, netwerken en internet	10
Multimedia	5
Tekstverwerking	11
Rekenblad	11
Presentaties	3
Algoritmisch denken	10

Source: Leerplan informatica, VVKSO, 2011



Currently in education: grades 11-12

- CS is officially non-existent in grades 11 and 12 of Flemish "general" education
  - but some schools offer it in the non-official part of the programme
- Some CS is part of 2 IT/IS oriented study profiles in "application oriented" economics education
  - Accountancy – IT: focus on data management and software development in a business setting
  - IT Management: focus on system administration and network management



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Teacher education in "informatics" at "professional bachelor" level

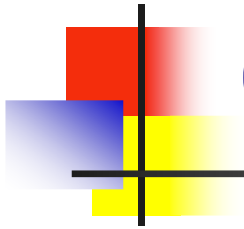
- Topic in (this kind of) teacher training since 1997
  - Law stipulates "burotica of informatica" ???
- 180 ECTS (3 years)
  - Students choose 2 topics of 40 to 45 ECTS each
  - + teaching practice
- Teaching "permit" in grades 7 to 10
  (up to grade 13 in vocational education)
- (We officially teach teachers to teach a topic which officially does not exist… ☺)
- Recently: severe decline in student numbers ☹

KHLeuven programme (in Dutch)

Fase 1	Fase 2	Fase 3
Applicatiesoftware en gegevensbeheer (5 SP, s1)	Applicaties en programmeren in het SO (3 SP, s3)	ICT, ethiek, samenleving en onderwijs (4 SP, s5)
Programmeren I (7 SP, s2)	Programmeren II (3 SP, s3)	
Computersystemen I: Hardware en besturingssys-temen (3 SP, s1/2)	Computersystemen II: Netwerken (3 SP, s4)	Computersystemen III: Labo netwerken (3 SP, s5)
Inleiding tot de informatica (3 SP, s1)	Websitebouw en multimedia (3 SP, s4)	*Optioneel:* *Afstudeeronderzoek informatica (9 SP, s5-6)*
Didactisch atelier in de informatica (5 SP, s1-2)	Didactisch seminarie in de informatica (3 SP, s3-4)	
	ICT voor het onderwijs (3 SP, s3)	

Teacher training in CS at the master level

- Teacher training for domain experts: 60 ECTS
- Masters can get a “teaching permit” for grades 9 – 12(13) (and higher education)
- 4 Flemish universities offer CS teacher training to masters in CS (and related fields) …
- … but jointly attract < 10 students annually



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i22n

- Jointly founded May 2013 by professors (CS and/or CS teacher training) from all 5 Flemish universities
- Main goals:
  - make/help improve educational policy on CS
  - support teachers and schools in teaching CS
- http://i22n.org
- http://2link2.org (organisation of/for CS teachers …)
  => Annick Van Daele

Coderdojo

CoderDojoBelgium

Welkom bij CoderDojo Belgium

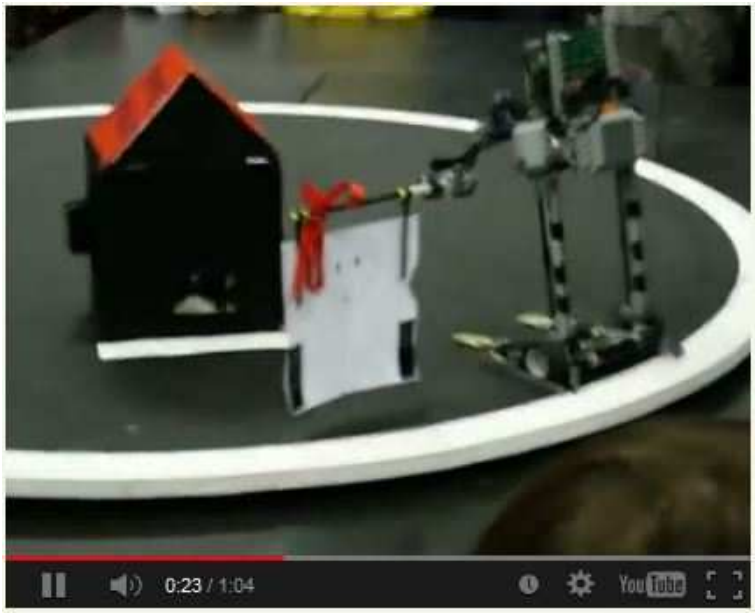
Kalender

Aalst
Antwerpen
Antwerpen 2060
Antwerpen Zuid
Bredene
Brugge
Brussel
Corda
Dendermonde
De Pinte
Dilbeek
Eeklo
Genk
Gent
Hasselt
Ieper
Izegem
Klein Brabant
Kortrijk
Leuven
Lier
Lubbeek
Mechelen
Oostende
Roeselare
Tielt
Waterloo
CoderDojo Creativity Gym
CoderDojo Special

Source: http://www.coderdojobelgium.be

Dwengo

Founded by people from UGent: Francis wyffels …



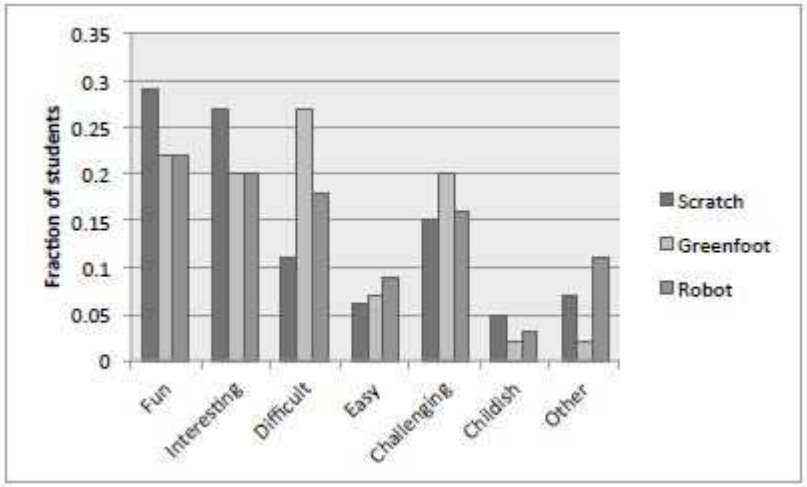
Goal: support and promote CS and/in STEM education
=> Francis wyffels

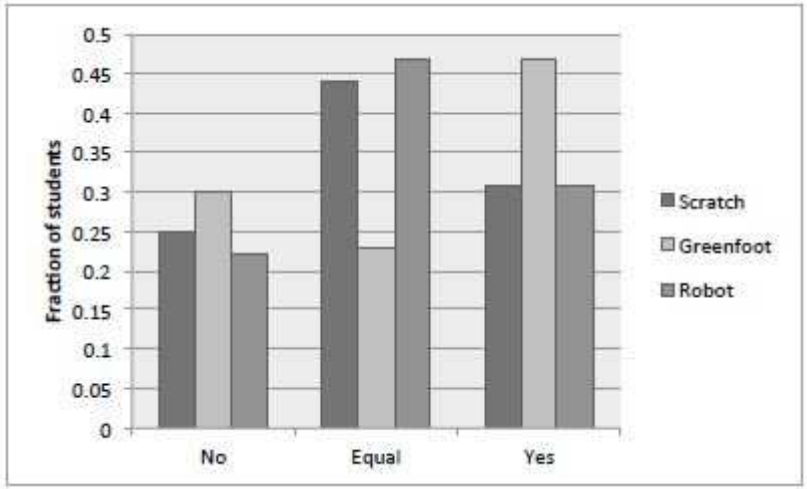
Source: http://www.dwengo.org

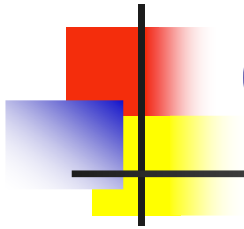
Meanwhile "in the field"…

Starting from Scratch: Experimenting with Computer Science in Flemish Secondary Education

wyffels, Martens and Lemmens, Accepted for WiPSCE2014







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Improving educational policy

- Ongoing work …
  - working group KVAB

Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten
1938 KVAB 2013

    - report with recommendations by end of 2014?
  - meetings with civil servants from Ministry of Education, (re)defining educational standards

Ond.vlaanderen.be
Website van het Vlaams Ministerie van Onderwijs en Vorming

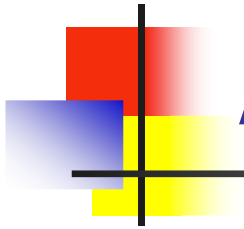
  - being here ☺

STEM

- What is the proper place and role of CS in the ongoing renewal of STEM education?
  - in primary school
  - in secondary school
    - "programming and modelling" is one of the 3 core threads currently proposed for an "abstract engineering" profile in math-science education

STEM@school: Developing and introducing integrated Science,Technology, Engineering and Mathematics education to Flemish secondary schools http://set.kuleuven.be/English/news/2014/stem-school

How to teach future teachers
"Problem solving in multi-disciplinary contexts" (and teach it) … ?



Acknowledgements

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  Hilde De Gezelle, Bart Boelen, Gerben Dierick, …
- KU Leuven:
  Bart Demoen, Wim Dehaene, Mieke Decock, …
- i22n:
  Tom Hofkens (UAntwerpen), Frank Neven (UHasselt),
  Francis wyffels (UGent & Dwengo), …
- … and you